

WHAT IS CLAIMED IS:

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1. A method of heart stimulation using an implantable heart stimulator capable of detecting a plurality of arrhythmias and capable of single or multi-mode operation to treat any of the detected arrhythmias, comprising the steps of:

- (a) determining a condition of the heart from among a plurality of conditions of the heart;
- (b) selecting at least one mode of operation of the implantable heart stimulator for treating said determined condition; and
- (c) executing said at least one mode of operation of said implantable heart stimulator, whereby to treat said determined condition.

2. The method of claim 1, further comprising the step (d) of repeating said steps (a)-(c), whereby to continuously monitor and treat determined heart conditions.

3. The method of claim 1, wherein said at least one mode of operation of said implantable heart stimulator includes a cardiac pacer mode of operation.

4. The method of claim 1, wherein said at least one mode of operation of said implantable heart stimulator includes cardioversion.

5. The method of claim 1, wherein said at least one mode of operation of said implantable heart stimulator includes automatic defibrillation.

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6. The method of claim 1, wherein said at least one mode of operation of said implantable heart stimulator comprises a plurality of modes of operation of said implantable heart stimulator, ~~corresponding to respective arrhythmias~~, ^{unique} said method further comprising the step of providing said implantable heart stimulator with dual processors, one of said dual processors being designed to efficiently implement a first group of said plurality of modes of operation of said implantable heart stimulator, and a second one of said dual processors being designed to efficiently implement a second group of said plurality of modes of operation of said implantable heart stimulator.

7. The method of claim 1, wherein said implantable heart stimulator is microprocessor-controlled, said method further comprising the step of externally programming said microprocessor-controlled implantable heart stimulator with respect to said at least one mode of operation thereof.

8. The method of claim 1, wherein said implantable heart stimulator is capable of operation in a cardiac pacer mode of operation and an automatic defibrillation mode of operation;

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said step (a) comprising determining the presence or absence of ^{a naturally induced} ~~an~~ R-wave of the heart rhythm;

said step (b) comprising selecting said cardiac pacer mode of operation;

said step (c) comprising executing said cardiac pacer mode of operation to pace the heart;

said method comprising the further steps of:

(d) determining the presence or absence of a forced R-wave;

(e) selecting, in the absence of said forced R-wave, the automatic defibrillation mode of operation; and

(f) executing, in the absence of said forced R-wave, said automatic defibrillation mode of operation to automatically defibrillate the heart.

9. The method of claim 8, wherein said step (e) further comprises, in the presence of a forced R-wave, returning to said step (a).

~~Sub a 3>~~ 10. An implantable heart stimulator for monitoring and automatically treating a plurality of conditions of the heart, and capable of detecting a plurality of arrhythmias, and capable of single or multi-mode operation to treat any of the detected arrhythmias, comprising:

determining means for determining the occurrence of a given condition from among said plurality of conditions;

selecting means for selecting at least one mode of operation of said implantable heart stimulator for treating said determined condition; and

executing means for executing said at least one mode of operation, whereby to treat said determined condition.

11. The stimulator of claim 10, wherein said implantable heart stimulator continuously monitors the heart in order to determine the occurrence of any said plurality of conditions.

12. The stimulator of claim 10, wherein said at least one mode of operation includes cardiac pacing.

a 13. The stimulator of claim ¹⁰ 8, wherein said at least one mode of operation includes cardioversion.

a 14. The stimulator of claim ¹⁰ 8, wherein said at least one mode of operation includes automatic defibrillation.

a 15. The stimulator of claim 10, wherein said determining means comprises a first detecting circuit for detecting presence or absence of ^{naturally induced} an R-wave of the heart, and a second detecting circuit for detecting presence or absence of a forced R-wave of the heart, said selecting means being responsive to absence of ^{natural} R-wave for selecting a cardiac pacer mode of operation, said executing means being responsive to selection of said cardiac pacer mode of operation for pacing the heart, said selecting means being responsive to absence of said forced R-wave for selecting an automatic defibrillation mode of operation, said executing means being responsive to selection of said automatic defibrillation mode of operation for automatically defibrillating the heart.

16. The stimulator of claim 15, wherein said second detecting circuit is actuated to detect the presence or absence of said forced R-wave only after selection and execution of said cardiac pacer mode of operation.

17. The stimulator of claim 16, wherein said selecting means responds to detection of said forced R-wave by inhibiting execution of said automatic defibrillator mode of operation.

Sub A4> 18. An implantable heart stimulator for monitoring a heart and treating a plurality of conditions of said heart, comprising:

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~~input means for receiving various status and sensor inputs;~~

~~controller means for processing said various status and sensor inputs to determine the occurrence of a given condition from among said plurality of conditions, and for selectively performing at least one mode of operation for treating said determined condition, and issuing corresponding control outputs; and~~

~~output means responsive to said control outputs of said controller means for electrically stimulating the heart so as to treat said determined condition.~~

~~19. The stimulator of claim 18, wherein said at least one mode of operation comprises a plurality of modes of operation, said controller means comprising first and second processors, said first processor executing a first group of said plurality of modes of operation so as to treat a first group of said plurality of conditions, said second processor executing a second group of said plurality of modes of operation so as to treat a second group of said plurality of conditions.~~

~~20. The stimulator of claim 18, further comprising data input/output channel means for providing data to and from said implantable heart stimulator.~~

~~21. The stimulator of claim 18, wherein said controller means comprises at least one programmable microprocessor.~~

22. The stimulator of claim 18, wherein said output means includes a cardiac pacer.

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23. The stimulator of claim 18, wherein said output means includes a cardioverting device.

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24. The stimulator of claim 18, wherein said output means comprises an automatic defibrillator.

~~25. The stimulator of claim 18, wherein said at~~

~~least one mode of operation includes a cardiac pacer mode of operation and an automatic defibrillator mode of operation, said input means receiving a first sensor input corresponding to presence or absence of an R-wave of the heart and a second sensor input corresponding to presence or absence of a forced R-wave of the heart, said controller means determining the absence of said R-wave of the heart and responding thereto for issuing a cardiac pacer control output to cause cardiac pacing of the heart, said controller means subsequently determining the presence or absence of said forced R-wave of the heart and responding to the absence thereof for issuing an automatic defibrillation control output causing automatic defibrillation of the heart.~~

~~26. The stimulator of claim 25, wherein said~~

~~controller means responds to the presence of said forced R-wave of the heart for monitoring said R-wave sensor inputs and inhibiting further electrical stimulation of the heart until absence of said R-wave of the heart is detected.~~

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